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Natural Science has adopted with its January number the plan recently reported in this journal of underlining the most important word or words in the title of each article, and of giving at the head of the article the index number under which the article is placed in the Dewey system of classification. The index number, supposing a satisfactory system of classification can be agreed upon, would seem to satisfy the requirements of bibliographical classification. The significant word in the title is usually easy to discover, and when the title is well chosen all the words are apt to be significant. Thus the articles in the current number of *Natural Science* on 'The Endeavor After Well Being,' 'The Constantinople Earthquake of July 10, 1894,' and 'The Perth Museum of Natural History,' have all the words excepting the articles and prepositions partly or entirely underlined. It might, however, lead authors to be more careful in the choice of titles if they considered the necessity of underlining the words significant of the contents of the article.

UNIVERSITY AND EDUCATIONAL NEWS.

CONTRACTS have been awarded for the construction of the Schemmerhorn Hall of Natural Sciences and the Hall of Physics for Columbia College. The buildings will be ready for occupancy in the summer of 1897. The Trustees of Barnard College, at a meeting held on the 17th ult., accepted the plans and specifications for the proposed new building to be erected at the Boulevard and 119th street. The building is to be 200 by 160 feet, and will cost about \$500,000.

THE Council of the University of the City of New York has decided to continue the summer courses inaugurated last year. The session will be held at University Heights from July 13th to August 21st. Courses will be offered in ten departments.

PROF. J. H. VAN'T HOFF, the brilliant chemist, now at Amsterdam, has resigned, probably to take a place created for him in the University of Berlin. The city of Amsterdam and the Dutch government made every effort to prevent him from leaving Holland. The authorities of the University offered to appoint an assistant professor whose duty it should be to give all the

lectures and attend to all examinations. All that they required of Van't Hoff was the giving of two lectures a week. It is doubtful whether any professor has ever received a more flattering offer.

THE Boston *Transcript* states that some years ago J. H. Armstrong, of Plattsburg, deeded a considerable property to Union College, but retained a life interest in it. On January 2d of this year he died, and by his will added to the gift, which now amounts to \$100,000. Mr. Armstrong was a lawyer, and it was his intention that the department of sociology should be benefited by his will.

THE Legislature of Massachusetts has passed the bill appropriating \$25,000 to the Massachusetts Institute of Technology.

MRS. JOSIAH N. FISKE has given Barnard College \$5,000 for the foundation of a scholarship which will be open to competition.

DISCUSSION AND CORRESPONDENCE.

MARSH GAS UNDER ICE.

AN interesting chemical experiment, quite new to me, was performed by a party of skaters in the neighborhood of Baltimore a few days ago. It is possible that it has been performed before, but I have not yet found any one who has seen or heard of it, and I therefore think it may interest the readers of SCIENCE. The skaters were on a large artificial lake upon which remarkably clear ice had formed. In various places white spots were noticed in the ice, suggesting, as one of the skaters said to me, 'air bubbles.' Some one bored a hole through one of these white places, and applied a flame to the gas, which took fire. This led to further experiments, and it was found that, by boring a small hole, a long thin jet of flame could be obtained, and this continued for some time. The gas was, of course, marsh gas, formed by the decomposition of the vegetable matter at the bottom of the lake. The above method of demonstrating the formation of this gas in nature is, from the æsthetic point of view, a great improvement on the usual method described in the text-books, which consists in stirring a pool of stagnant water with a stick, and collecting the gas that rises to the surface.

Skating ponds illuminated by natural gas are among the possibilities of the future.

IRA REMSEN.

BALTIMORE, January 14, 1896.

'PROFESSORS' GARNER AND GATES.

THE daily papers state that Mr. Richard L. Garner, whose alleged investigation of the speech of monkeys has been so prominently advertised, is again expected in America. Accounts of the alleged investigations of Mr. Elmer Gates on the development of the brain are also being extensively reported. It is perhaps the duty of a scientific journal to state that neither of these gentlemen has as yet published scientific work deserving serious consideration.

J. MCK. C.

SCIENTIFIC LITERATURE.

The Psychology of Number and Its Applications to Methods of Teaching Arithmetic: By JAMES A.

McLELLAN, A.M., LL.D., and JOHN DEWEY, Ph.D. International Educational Series. D. Appleton & Co., New York.

This book makes a false analysis of the number concept, but advocates methods in teaching arithmetic which are in the main good. The conviction of its authors that the difficulties which children have with arithmetic are due to the neglect of teachers to lay sufficient stress on the metrical function of number has carried them to the extreme of maintaining that number is essentially metrical in its nature and origin. The conviction is well founded, inasmuch as the first serious difficulties of children are with fractions whose primitive function was unquestionably metrical and to which men in general attach no other than a metrical meaning; but there is no reason for drawing the conclusion that because the fraction, which is but a secondary concept of arithmetic, is metrical, its primary concept, the integer, is metrical also, or even that because a child can hardly be made to understand fractions without associating them with measurement, he requires the same help with integers. Nevertheless, the authors of this book maintain, in the most unqualified manner, that the integer is essentially metrical and should be taught accordingly. Thus they account as follows for the origin of number: Man found himself in a world in which the

supply of almost everything that he needed was limited. To obtain what he required, therefore, an economy of effort, a careful adjustment of means to an end, was necessary. But the process of adjusting means to an end is valuable in the degree in which it establishes an exact balance between them. "In the effort to attain such a balance, the vague quantitative ideas of smaller and greater * * * were transformed into the definite quantitative ideas of just so distant, so long * * *. This demands the introduction of the idea of number. Number is the definite measurement, the definite valuation of a quantity falling within a given limit."

They define counting, the fundamental numerical operation as but measuring with an undefined unit. "We are accustomed to distinguish counting from measuring. Nevertheless, all counting is measuring and all measuring counting. The difference is that in what is ordinarily termed counting, as distinct from measuring, we work with an undefined unit; it is vague measurement because our unit is unmeasured.

* * * If I count off four books, 'book,' the unit which serves as unit of measurement, is only a *qualitative*, not a *quantitative* unit."

And they formally define number as 'the repetition of a certain magnitude used as the unit of measurement to equal or express the comparative value of a magnitude of the same kind,' a definition which, so far as it goes, agrees, it is true, with that given by Newton in his *Arithmetica Universalis*, viz, 'the abstract ratio of any quantity to another quantity of the same kind taken as unit,' though Newton's purpose having been to formulate a working definition comprehensive enough to include the irrational number, it is anything but evident that this statement represents his analysis of the notion of number in the primary sense.

The immediate objection to all this is that it is much too artificial to be sound. And in fact it requires but a little reflection to be convinced that pure number is not metrical and that counting is not measuring, but something so much simpler that men must have counted long before they knew how to measure in any proper sense.

It is not enough to say that counting is the simplest mathematical operation; it is one of the simplest of intellectual acts. For to count a